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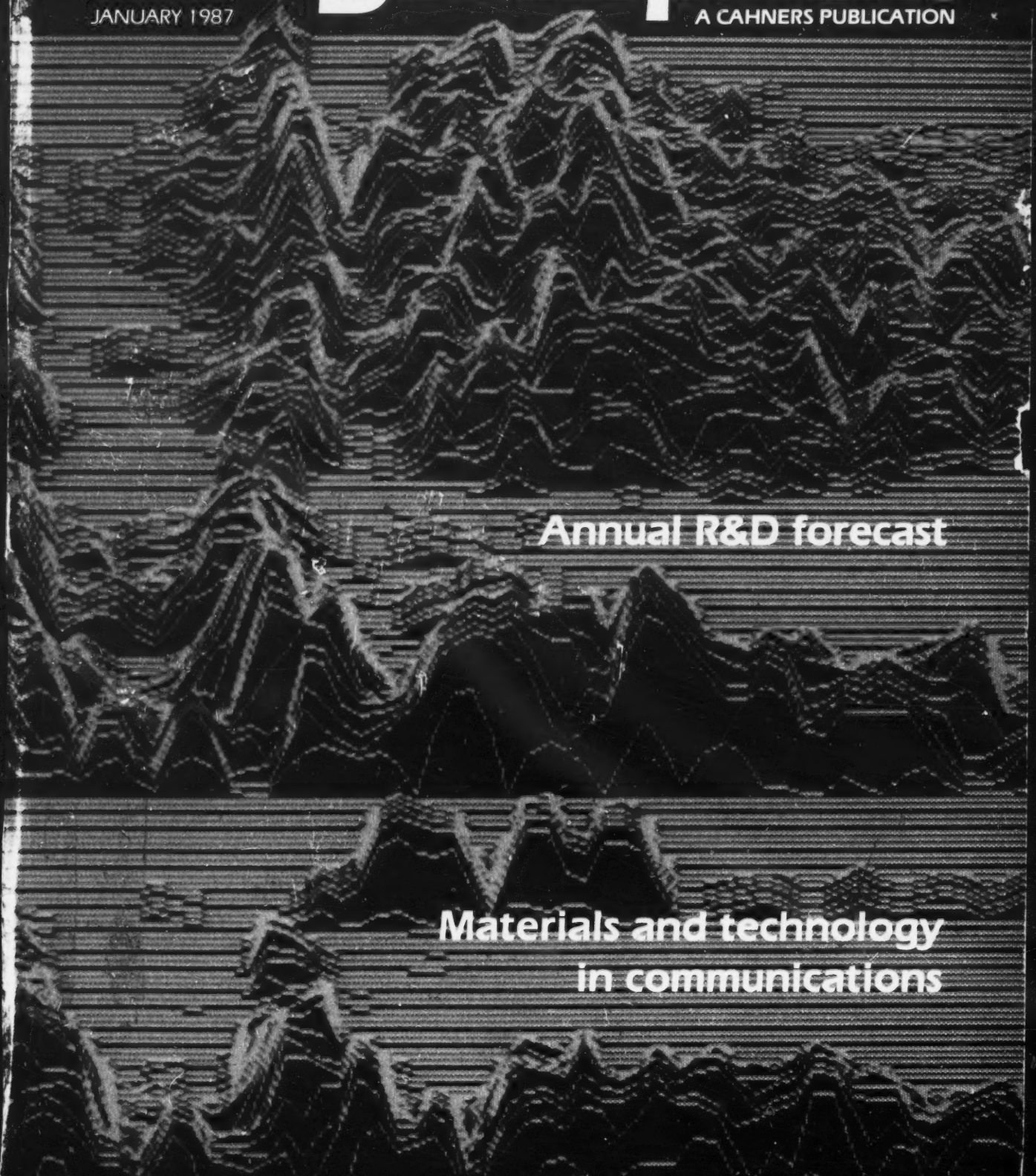

Annual R&D forecast

Materials and technology in communications

SERVING THE $235-BILLION WORLDWIDE R&D INDUSTRY

Research & Development

The magazine with the **IR100 Awards**

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CIRCLE **101** ON INQUIRY CARD

$125 billion for R&D in the USA in 1987

Total funding will increase almost 6%, keeping research and development abreast of growth in the general economy as industry funding increase wanes, and government and other sectors gain shares of total.

C.J. Mosbacher
Consultant, *R&D* magazine

ADD AT LEAST $7 billion to research and development funding for 1987. After consideration of a multiplicity of factors, more than usual, that is what our forecast indicates.

What factors? A new tax law that not only changes tax rates but also changes the ground rules for R&D tax credits and charitable contributions. A Congress that changes Presidentially budgeted priorities in R&D funding. A trend toward more cooperative research and development projects carried out by universities and other nonprofit organizations. And even fewer dollars for R&D in 1986 than we forecast last January, which was offset by even lower inflation than expected.

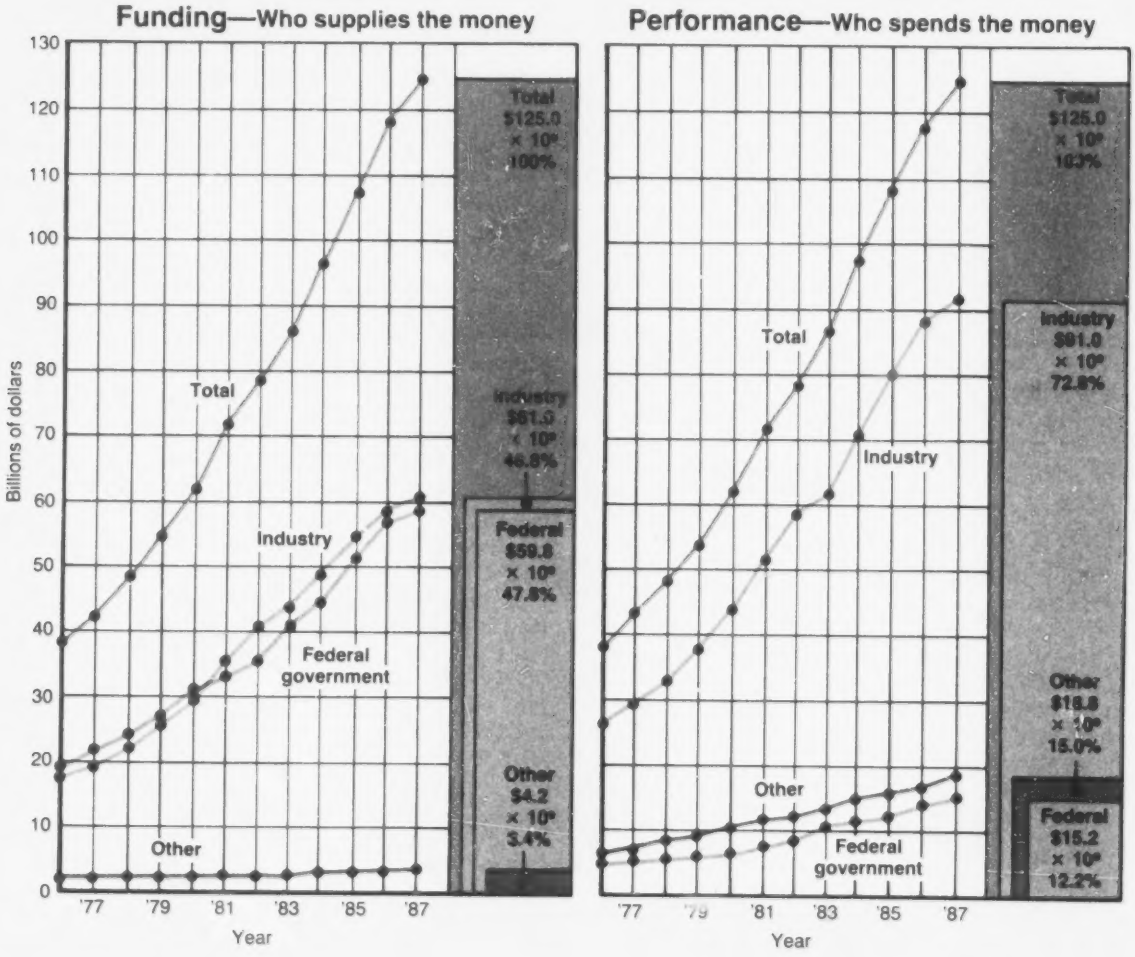
Thus we start with $118 billion instead of $119 billion for 1986 funding. After tracking Federal budgets, Congressional authorizations and appropriations, and actual Federal obligations and expenditures, studying financial reports and other documents from the industrial and other sectors, and speaking with leaders from all sectors, we combined the data to arrive at a projected increase of 5.93% for a total of $125 billion for R&D in calendar 1987.

As can be seen in the graphs accompanying this article, the 1987 total includes $61.0 billion from industry, $59.8 billion from the Federal government, and $4.2 billion from other sources, which include universities, colleges, and other nonprofit organizations. Thus industry is projected to provide 48.8% of 1987 funding, the Federal government 47.8%, and other sources 3.4%.

Considering transfers of funds between sectors, we can project where funds will be spent in the performance of research and development. Our forecast is that industry will use $91.0 billion in 1987, while Federal government laboratories will use $15.2 billion and other sectors $18.8 billion. Thus industry will spend 72.8% of the total dollars available in 1987, the Federal government 12.2%, and other sectors 15.0%.

Lower 1986 dollars

Shortly after our forecast of 1986 R&D funding was prepared, the National Science Foundation pub-



lished its "Science and Technology Data Book" (NSF 85-323), which contained its first estimate of 1986 funding, $122 billion. Included were $58.85 billion of industry funding, $59.25 billion Federal government funding, and $3.9 billion from other sources. That was much higher than our *Research & Development* magazine forecast of $119 billion, which included $58.0 billion of industry funds, $57.2 billion Federal government, and $3.8 billion from other sources.

Subsequently, NSF revised its projections in "National Patterns of Science and Technology Resources 1986" (NSF 86-309), which was dated March 1986 and issued later in the year. Their new projection was for $118.6 billion in 1986 funding. Funding included $59.48 billion from industry, $55.25 billion Federal government, and $3.88 billion other sources. Corresponding amounts for performance of R&D were $87.0 billion by industry, $14.0 billion by Federal government facilities, and $17.6 billion by universities, colleges, and other nonprofit organizations.

As 1986 progressed, it became evident that these NSF data, which were assembled early in the year, would have to be revised on the basis of events that were occurring. While Gramm-Rudman-mandated cuts reduced Federal funding, they were curtailed by a Supreme Court decision. In addition, delays in action on funds for fiscal 1987, which affected fourth quarter 1986, actually increased some funding as Congress adopted continuing resolutions to keep Federally funded activities going. Therefore, in the estimates in our forecast, we used $56.0 billion for Federal funding for 1986.

Conversely, our studies of the industrial sector indicated that, rather than raising industry funding estimates in line with NSF, we would keep our original 1986 forecast projection of $58.0 billion.

As for the academic and nonprofit sector, we raised our estimated 1986 funding $0.1 billion to $3.9 billion. That's how we arrived at the revised total of $118.0 billion for 1986 funding of R&D.

Our results for 1986 performance, as would be expected, also differ from the NSF data. Our estimates

are that industry spent $86.5 billion in 1986, slightly less than the NSF projected, while performance of R&D was $14.0 billion in Federal facilities, agreeing with the NSF data. Our estimate of performance for other sectors was slightly lower than that of NSF at $17.5 billion.

Thus in 1986, industry provided 49.2% of funds for research and development, the Federal government provided 47.5%, and the university and nonprofit sector provided 3.3%. Industry performed 73.3% of the total research and development, Federal facilities performed 11.9%, and universities and nonprofit organizations performed 14.8%.

When these proportions are compared to those indicated earlier for 1987 based on this forecast, a slight shift is seen. Industry's share declines slightly both in funding and performance while the share increases for the other two sectors.

For some time, industry has been increasing its share of funding each year. Its share of performance had been increasing even more as Federal funding moved toward more funding of applied research and development and away from basic research. That meant more Federal dollars going to industry on top of industry's own funding, raising its share of total performance even more. In 1986, a trend toward more basic research funding by the Federal government began. That trend continues.

Whether the slight changes indicated by our forecast comprise a trend away from industrial sector dominance of funding is debatable. Our feeling is that industry funding levels have been hurt by the current economy and may increase considerably if economic expansion goes to higher levels later in 1987 as expected by many economists.

Growth in industry funding slows

Hope for a sudden improvement in the general economy are all well and good, but the fact remains that 1986 was not a great year for American industry. To date, the consensus forecast by economists is for more of the slow growth to continue. Economists who are forecasting increased gross national product expect larger increases toward the end of 1987, with growth averaging about 3% for the year.

Inflation for 1986 was about 2%, and the consensus of economists' forecasts for 1987 at the time this forecast was written was 3.2%. We expect that 1987 inflation will be slightly lower than that; the trend in the consensus over the past few months has been steadily toward lower values.

Thus, we expect the general economy to show an increase of about 6% in 1987, which is just about the same as the 5.93% increase in total R&D funding we are forecasting. If inflation does not increase as the economists expect, R&D funding could gain more than the general economy.

However, industry funding will not quite keep abreast. Our projections indicate an increase of 4.99%. Industry performance, however, will grow some 5.2%.

Confirming this forecast, the NSF issued advanced information dated Nov. 4, 1986. Growth in industry funding during 1987 is projected to grow approximately 5% to nearly $60 billion. While our forecasted funding is higher, the percentage increase is the same. We have confidence in our figure of $61 billion.

The NSF report is based on responses to a mail survey of its Industrial Panel on Science and Technology augmented by interviews with some of its 95 members. "Industry officials said that reasons for the moderate increase include poor sales expectations in durable-goods industries, concerns about short-term profitability, and the need to restructure R&D efforts after corporate mergers," the advanced report said.

"The electrical equipment industry plans the largest average annual increase in R&D expenditures from 1985 to 1987—10%. Among the next five major R&D-performing industries, the increases were as follows: machinery (including computers), 7%; chemicals, 6%; aircraft, 6%; instruments, 5%; and motor vehicles, 4%. The primary-metals industry projected an average annual increases of 5% from 1985 to 1987, and petroleum firms forecast decreases of 11%," the report by NSF said.

Congress changes Federal emphasis

Once again Congress waited until the last minute to pass continuing resolutions to fund the Federal government. In the process, it cut "Star Wars" R&D for the second year. As usual, it increased funds for health research, this time adding $1 billion to the request by the President. That billion caused the increase in Federal funding to go from 5% to 6.79%.

Had Congress acted earlier, more of the fiscal 1987 funds might have been spent in calendar 1986 after the Federal government's fiscal year started on October 1.

More support for academia, nonprofits

Nonprofit organizations and universities will increase their own funding of R&D in 1987 more than the other sectors will on a percentage basis. In actual dollars, however, the increases will be comparatively small. Part of the increase is to compensate for Federal overhead charges being reduced. Another portion is increased contributions caused late in 1986 by changes in how charitable contributions are treated under the new tax law.

Also contributing to these sectors' increases in performance of R&D are increased funding of academic basic research by the Dept. of Defense as mandated by Congress, and increased industrial funding of cooperative R&D programs both in the university and nonprofit sectors.

In summary, we expect R&D funding in 1987 to increase adequately to keep up with the general economy and inflation. If the industrial economy improves more than expected, we could see even higher levels of R&D funding. **R&D**

C.J. Mosbacher has continued as a consultant to *Research & Development* magazine since he retired as Executive Editor on January 1, 1986.